

No. 6

**De Havilland DHC-8-100, HS-SKI, accident near
Samui Airport, Surat Thani Province, Thailand on 21 November 1990.
Report released by the Aircraft Accident Investigation Committee,
Ministry of Transport and Communications, Thailand**

SYNOPSIS

Bangkok Airways Aircraft, DASH 8-100, NATIONALITY AND REGISTRATION MARKS HS-SKI, Flight Number BKP 125 was on domestic scheduled passenger flight Bangkok-Samui with five crew and thirty three passengers onboard. BKP 125 departed Bangkok Airport at 09:58 hrs, on November 21, 1990. The flight estimated to be over Samui Airport at 11:13 hrs. BKP 125 made an approach to land on runway 35 of Samui Airport by joining right hand down wind, turning base leg and proceeding to the final of runway 35 respectively. Due to bad weather, the pilot could not have runway insight, he failed to turn right when the aircraft entered final point of runway 35, to keep aircraft heading along final leg but the pilot continued to proceed on base leg direction. Later on BKP 125 crashed into the terrain. The accident occurred at approximately 11:15 hrs. The accident site was in the vicinity of Chaweng Beach, Tambon Bo-Pud, Samui District of Surat Thani Province, about 5 kilometers southwest of Samui Airport.

The Bangkok Airways Company notified Department of Aviation of the accident. The Department of Aviation notified Canada, the State of Manufacture. The Government of Canada sent accredited representative and advisers to participate in the investigation.

All times in this report are UTC.

1. FACTUAL INFORMATION

1.1 History of the Flight

On November 21, 1990 Bangkok Airways Aircraft, DASH 8-100, HS-SKI, Flight Number BKP 125 was on domestic scheduled passenger flight Bangkok-Samui with five crew and thirty three passengers onboard. BKP 125 departed Bangkok Airport at 09:58 hrs with IFR clearance from Bangkok Area Control Centre to

Samui Airport via A464, FL 210. The flight estimated to be over Samui Airport at 11:13 hrs. BKP 125 first established contact with Samui Aerodrome Control Tower at 10:45 hrs while it was about 120 nautical miles from Samui Airport. Samui Tower gave instruction to BKP 125 to prepare the flight for landing on runway 17 and also advised BKP 125 that the weather in the vicinity of Samui Airport was fair but there was raining on the southwest of Samui Airport. BKP 125 was asked to report its position to Samui Tower at 50 nautical miles from Samui Airport. BKP 125 did not report its position to Samui Tower at 50 nautical miles but it reported position at 20 nautical miles. Later on Samui Tower advised BKP 125 that there was drizzle in the vicinity of Samui Airport, wind was blowing from 030 degrees at velocity of 10 knots, visibility was 6 kilometres, the runway in used was changed from 17 to 35 and report entering right hand down wind of runway 35. About one minute later, Samui Tower advised BKP 125 again that there was good weather condition on the east of airport that could be flown but there was heavy rain on the west. Four minutes later, Samui Tower advised BKP 125 that all runway lights were operated and they were operating normally and asked BKP 125 to report when it had runway insight. BKP 125 reported runway insight and Samui Tower requested BKP 125 to report its position at base leg and checked its landing gears down. Samui Tower observed that landing gears of BKP 125 had already in extended position while it was being at base leg of runway 35. At the final of runway 35, the aircraft must made a right turn to intercept final leg and continued to keep its heading along final leg which aligned to runway 35 direction but BKP 125 flew straight ahead on base leg direction and then it tended to deviate to the left, to the west of airport during which time there was heavy rain on the west side of airport. Samui Tower then asked BKP 125 "Will you make left turn out?". BKP 125 did not respond Samui Tower. During that time cockpit conversation was inadvertently transmitted on the air "gain goeing for Max-Power Sir" but Samui Tower interpreted that the pilot said "I met problem". He then asked pilot of BKP 125 "Do you have any problem?". The pilot replied "I can not see the runway". Then he asked Samui Tower "Left turn or right turn?". Samui Tower gave an advice to BKP 125 "There is a hill on the right hand side, make left turn out". AT that moment, Samui Tower had seen BKP 125 flew into the area of heavy rain and then disappeared from their sight. Samui Tower made many repeated contacts with BKP 125 but there was no reply from BKP 125. At 11:15 hrs Samui Tower initiated communication search by contacted local units concerned and

received the report from local police that BKP 125 crashed in the vicinity of Chaweng beach, Tam-Bon Bo-Pud, Samui District of Surat Thani Province, approximately 5 kilometres southwest of Samui Airport. There were no survivors from the accident.

1.2 Injuries to Persons

Injuries	Crew	Passengers	Others
Fatal	5	33	-
Serious	-	-	-
Minor/None	-	-	

1.3 Damage to Aircraft

The aircraft was destroyed.

1.4 Other Damage

Ten of coconuts and mangoes plantation were destroyed.

1.5 Personnel Information

1.5.1 The pilot - in - command named Flying Officer (Ret.)

aged 54, held an Airline Transport Pilot Licence number D-0091 issued by the Department of Aviation, Ministry of Transport and communications, valid until January 23, 1991. His licence carried a rating for Aeroplane, Single and Multi Engine, Land, Pilot for DASH 8-100, EMB 110 P2 and DASH 8-300 with Instrument Rating entered in the licence. He also held medical Certificate issued by Aviation Medicine Institute of Royal Thai Air

Force on July, 24 1990 valid until January 23 1991 with limitation endorsed in the Certificate that he must wear corrective lens fixed while exercising his privilege of the licence. His flying experience are as follows:

Total Flight Time	14,764:52	hours
Flight Time on DASH 8	521:14	hours
Flight Time on the last 90 days	314:20	hours
Flight time on the last 30 days	94:50	hours
Flight time on the last 24 hours	1:27	hours
Rest Period	24:00	hours

1.5.2 The Co-pilot named Mr. aged 38, held Commercial Pilot Licence number B-0612 issued by the Department of Aviation, Ministry of Transport and Communications, valid until April 1, 1992. His licence carried a rating for Aeroplane, Single and Multi-Engine, Land, Co-pilot for DASH 8-100 and Co-pilot for DASH 8-300 with Instrument Rating entered in the licence. He also held Medical Certificate issued by Aviation Medicine Institute of Royal Thai Air Force on October 20, 1990 valid until October 19, 1991 with no limitation. His flying experience are as follows:

Total Flight Time	674:22	hours
Flight Time on DASH 8	235:22	hours
Flight Time on the last 90 days	214:10	hours
Flight Time on the last 30 days	64:55	hours
Flight Time on the last 24 hours	1:27	hours
Rest Period	48:00	hours

1.5.3 The Observer Pilot named Group Captain (Ret.) aged 54 held Airline Transport Pilot Licence number D-0326 issued by the Department of Aviation, Ministry of Transport and Communications, valid until June 13, 1991. His licence carried a rating for Aeroplane, Single and Multi-Engine, Land with temporary Type Rating for Pilot of DASH 8-100. He also held Medical Certificate issued by Aviation Medicine Institute of Royal Thai Air Force on June 4, 1990 valid until December 3, 1990 with limitation endorsed in the certificate that he must wear corrective lens fixed while exercising his privilege of the licence. His flying experience are as follows:

Total Flight Time	3,190:30	hours
Flight Time on DASH 8	103:15	hours
Flight Time on the last 90 days	103:15	hours
Flight Time on the last 30 days	42:35	hours
Flight Time on the last 24 hours	1:07	hours
Rest Period	48:00	hours

1.6 Aircraft Information

1.6.1 Airframe

- 1.6.1.1 Aircraft Nationality and Registration Marks HS-SKI
- 1.6.1.2 Aircraft Type, DASH 8-100
- 1.6.1.3 Serial Number 172, Manufactured on September 13, 1989
- 1.6.1.4 Registration Certificate Number 20/2532 issued on September 21, 1989
- 1.6.1.5 Airworthiness Certificate Number 94/2533 valid from September 21, 1990 until September 20, 1991
- 1.6.1.6 Time since manufactured 3,416:11 hours
- 1.6.1.7 Number of cycles 2998
- 1.6.1.8 Owner GPJ Leasing N.V. Ltd., Kunstlaan 19 H Brussels 1040 Belgium
- 1.6.1.9 Manufacturer Boeing of Canada Ltd.
- 1.6.1.10 Operated by Bangkok Airways Company Ltd.

1.6.2 Engines

- 1.6.2.1 Pratt & Whitney of Canada Model PW 120 A
- 1.6.2.2 Turbo-Propeller
- 1.6.2.3 2000 SHPs
- 1.6.2.4 Port Serial Number PC-E 120964, Starboard Serial Number PC-E 120766
- 1.6.2.5 Time since manufactured 3,416:11 hours

1.6.3 Propeller

- 1.6.3.1 Hamilton Standard, Type 14 SF-7
- 1.6.3.2 Port Serial Number 890425, Starboard Serial Number 890426
- 1.6.3.3 Installed on HS-SKI with brand new condition
- 1.6.3.4 Time since manufactured 3,416:11 hours

1.7 Meteorological Information

There was drizzle at Samui Airport while BKP 125 was approaching to land. The Airport visibility was 6 kilometres. Wind was blowing from 030 degrees at velocity 10 knots. There was heavy rain on the south and southwest of the airport and at the crash site.

1.8 Aids to Navigation

NDB at Samui Airport was in operation during the accident of BKP 125. It was operating normally.

1.9 Communications

Two ways communication between BKP 125 and Samui Tower was normal. There was no discrepancy report on the communication.

1.10 Aerodrome Information

Samui Airport is a licenced airport operated by Bangkok Airways Co.ltd. It is located at Lat. 09° 33' North, Long. 100° 04' East. The runway is 1,400 metres long and 40 metres wide, asphalt surface. The airport elevation is 13.40 metres.

1.11 Flight Recorder

1.11.1 The Digital Flight Data Recorder was a Sunstrand model PN 980-4100-DXUN, Serial Number 6902, which recorded 34 parametres.

1.11.2 The Cockpit Voice Recorder was a Fairchild model 93-A100-80, Serial Number 54563.

1.11.3 The Digital Flight Data Recorder and the Cockpit Voice Recorder of HS-SKI were installed in the tail section of the aircraft. Both Digital Flight Data Recorder and Cockpit Voice Recorder were intact. They were hand carried by members of the Thai Aircraft Accident Investigation Committee to Engineering Branch of the Transportation Safety Board of Canada for readout. Full data were retrieved from Digital Flight Data Recorder Medium. Details are in Appendice.

1.12 Wreckage and Impact Information

The aircraft attitude was nose down and left bank as it impacted into the coconut plantation. The port wing cut off the trees. The nose section impacted terrain. Both wings were torn off from aircraft. Cockpit and passenger cabins were damaged by impact and caught fire. Tail section was still intact. The wreckage was disintegrated into parts. The accident site was 5 kilometres southwest of Samui Airport.

1.13 Medical and Pathological Information

1.13.1 Pathological examination of Group Captain showed multiple tear of all the internal organs and fractured of multiple bones. The cause of death was attributed to the severe force of impact upon the body during the aircraft crash.

1.13.2 Pathological examination of Flying Officer revealed tear of all the internal organs and fracture of multiple bones. The heart showed arteriosclerosis of left coronary artery with 50-80% blockage and complete obstruction of several small branches. There were some old myocardial infarction and myocardial enlargement in some area. The lungs showed chronic emphysema and chronic bronchitis. There were some degree of chronic nephritis. The cause of death was attributed to the multiple injuries from severe impact force during the crash.

1.13.3 Pathological examination of Mr. _____ revealed the same pattern of injuries and the same cause of death as Group Captain _____

1.14 Fire

Post impact fire occurred in this accident. Fire engulfed aircraft and its debris. It was put under control by Fire Fighting Unit of Samui District.

1.15 Survival Aspects

This accident was non survival.

1.16 Tests and Research

None

2. ANALYSIS

2.1 General

2.1.1 All flight crew members held valid licences and ratings issued by Department of Aviation. They were qualified for their respective privileges according to the laws and the regulations of the Kingdom of Thailand.

2.1.2 Two controllers of Samui Aerodrome Control Tower held valid Air Traffic Control Licences endorsed with Aerodrome Control Rating issued by the Department of Aviation.

2.1.3 Data From Digital Flight Data Recorder and Cockpit Voice Recorder revealed aircraft, powerplants, propellers and flight control systems were normal.

2.1.4 From original assignment by Bangkok Airways Company of flight crew personnel to perform respective duties on the BKP 125, Flying Officer _____ was assigned to be pilot-in-command, Mr. _____ was to be co-pilot and Group Captain _____ was to be observer pilot. But on the actual flight of BKP 125, Flying Officer _____, the pilot-in-command had appointed Group Captain _____, the observer pilot to act as a pilot - in - command for route training and Mr. _____, the co-pilot to act as observer pilot.

2.1.5 Samui Tower advised BKP 125 while it was joining traffic pattern of runway 35 that all airport lighting systems were operating normally and requested BKP 125 to report when runway was insight. From CVR recording revealed that Group Captain _____ reported to Samui Tower that he had runway insight. The controller of Samui Tower stated that he saw BKP 125 was turning base leg of runway 35. When BKP 125 was reaching the final of runway 35, it was continuing to fly straight ahead and then it was tended to deviate to the left. BKP 125 was continuing to deviate to the left and finally it entered into heavy rain area where there was a range of mountains ahead of the flight after that pilots were confusing about which way to turn (left or right) due to they did not know aircraft position. Details are in Appendix 1 and 2.

2.1.6 BKP 125 decided to go around due to pilot could not establish runway insight. According to Bangkok Airways Company procedure, when aircraft executed missed approach on runway 35, it must make a right turn out to open sea and turn back for recommencing landing or proceed to alternate airport. But in this case, BKP 125 encountered bad weather and pilot could not see the runway. They were not sure of aircraft present position and simultaneously Samui Tower asked them that would you turn left out? So that they were confusing which way to turn.

2.1.7 During the pilot was executing missed approach, the aircraft was continually increased left roll and left bank. The pilot was trying to correct the left roll but the flight control surfaces did not sufficiently counteract the left roll attitude to recover from left roll, it was understood that a possibility of severe disorientation.

2.1.8 Approximately 10 seconds before the aircraft impacted terrain, the pilot asked Samui Tower which way to turn. Samui Tower advised pilot to make a left turn out due to there are hills on the right hand side of BKP 125.

2.1.9 The Digital Flight Data Recorder revealed that approximately last 5 seconds, the pilot applied large left control wheel for one second, concurrently Samui Tower advised BKP 125 to turn left because there are hills on the right. The advice was likely to motivate the pilot to make an abrupt left turn in order to avoid hill on the right.

2.1.10 Pilots did not appear to make an attempt to correct the left roll attitude during the final seconds of the flight. On the contrary the pilot made severe left rudder and left aileron input while the aircraft was already in a left bank, caused the aircraft to roll to an 89 degrees left bank attitude. The aircraft dived to the terrain and impacted terrain at approximately 147 knots, 36 degrees nose down and 75 degrees left roll attitude.

2.2 Weather Condition at Samui Airport

There was no meteorological forecast station at Samui Airport, so that there was no METAR information available at Samui Airport. According to the testimonial of controllers of Samui Tower, during BKP 125 first contact Samui Tower at 120 nautical miles from Samui Airport, the weather in the vicinity of Samui Airport was good with no rain but there was rain in distance on the southwest of the airport. Samui Tower instructed BKP 125 to use runway 17 for landing. Later on BKP 125 contacted Samui Tower at 20 nautical miles from airport, there was beginning drizzle at the airport and visibility was decreased to 6 kilometres. Samui Tower advised BKP 125 to change runway from 17 to 35. The rain was moving from west to east toward the airport, beginning with consecutive passing drizzle followed heavy down pour for one hour and then stop. The characteristic of the rain similar to thunderstorm but it could not be proved that it was thunderstorm or it was local weather. It can not be proved that the aircraft was hit by downdraft of thunderstorm in dissipating stage.

2.3 Human Factors

2.3.1 During the flight, Group Captain _____ was acting as a pilot-in-command and Flying Officer _____ was acting as co-pilot with additional duties of supervisor and instructor. Communication between Flying Officer _____ and Group Captain _____ deteriorated through out the flight. It was apparent from the Cockpit Voice Recorder that Flying Officer _____ began to slowly grow annoyed with the performance of Group Captain _____ and that Flying Officer _____ took over control of the aircraft approximately two minutes before accident.

2.3.2 During _____ made an approach to the airport, both Flying Officer _____ and Group Captain _____ were trying to look for the airport but could not see it, due to poor visibility. With this single channel of attention, no one was monitoring or cross checking the flight instruments. In this situation where there is very little or no visual cue was available, it is likely that Flying Officer _____ did not realized the overall situation including the aircraft's true attitude.

2.3.3 During the call for go-around, Samui Tower asked BKP 125 "Go make a left turn". This half instruction and half question resulted in confusion about which direction to turn.

2.3.4 Flying Officer _____ was probably disoriented and unable to continue controlling the aircraft properly. So he said to Group Captain _____ "you, you fly too". Group Captain _____ previously was not handling the aircraft and was not aware of the aircraft actual attitude, when he was called for assistance or took over the control during the last critical moment of the flight. The confusion about the flight direction and unable to perceive the actual aircraft attitude made Group Captain _____ disorientation too. As a result Group Captain _____ was unable to control the aircraft the way he wanted and led to over controlling as in the Giant Hand Phenomenon. He abruptly turned the aircraft to the left while it was already banking to the left. Then the aircraft became stall and finally crashed. There is another possibility that the

confusion of controlling the aircraft led both pilots concurrently took the control wheel which resulted in abrupt deep turn and stall.

2.4 Psychophysiological Factors

2.4.1 Flying Stress in the cockpit

2.4.1.1 Flying Officer became obsessed in landing as soon as possible as to the airport might get close due to bad weather. He was also upset with the flying performance of Group Captain and kept continuing criticised Group Captain through out the flight as revealed by the Cockpit Voice Recorder.

2.4.1.2 Group Captain who was acting as a pilot-in-command was flying under pressure by criticism and flight check of by Flying Officer. The criticism was not only made Group Captain more stress but it was also made him distraction which might had contributed to the disruption of flying procedures and deteriorated the flight performance.

2.4.2 Poor Cockpit Co-ordination

There was very poor teamwork due to both pilots were not doing their duties and sometimes interfered with other's duties. Some of samples can be seen when they failed to contact the Tower at 50 miles of Samui Airport and did not respond to the Tower's call for gear down. There were also some unexpected changes in controlling the aircraft by the two pilots during the critical phase of flight.

2.4.3 Single Channel of Attention

During the critical phase before the accident, Flying Officer had paid attention on looking for the airport while he was flying but he could not see it. Then he asked other pilots help him looking for it. There were no ones were interested in monitoring flight instruments and actual attitude of the aircraft.

2.4.4 Poor Cockpit Communication

Some of the cockpit conversation during critical phase before accident was not cleared and could lead to confusion that who was supposed to control the aircraft. For instance "My control" and "you, you fly too".

2.4.5 Confusion of the Go-Around Procedure

According to Bangkok Airways Company Procedures when pilot executed missed approach on runway 35, he must make a right turn out to the open sea and return back for recommencing landing or proceeding to alternate airport. In this case, the pilot did not make pre-plan to execute missed approach and it was also too late to comply with the company missed approach procedure because the aircraft had already passed the final leg of runway 35 and there were hills on the right hand side of the flight path. During the stressful last few minutes and with a channelized attention, Flying Officer

who was used to the company procedure automatically reverted back to that procedure. This regression caused him to keep insisting on turning right while Samui Tower instructed him to turn left. The conflict with the Tower instruction and other pilots about which direction to turn during the last minute caused confusion in the cockpit.

2.4.6 Lack of Flying Experience by Group Captain

Group Captain was 54 years old. He had not flown for many consecutive years before beginning his training with this type of aircraft. The transition training to the new and complicated aircraft was very difficult for him at his age. The ability to learn new things was poor and he could not keep abreast of the situation in controlling the aircraft.

3. CONCLUSIONS

3.1 Findings

3.1.1 All flight crew members held valid medical certificates and licences carried ratings for their respective duties according to the laws and

the regulations of the Government of Thailand.

3.1.2 The aircraft was certificated, equipped and maintained according to rules and regulations of the Government of Thailand.

3.1.3 Digital Flight Data Recorder revealed engines, flight control surface and propellers were properly functioning before the accident.

3.1.4 There was rain on the west and southwest of Samui Airport. The rain was moving toward the airport. The aircraft, BKP 125, encountered bad weather while it was entering traffic pattern.

3.1.5 The pilot could not see the runway. They were confused about which way to turn, left or right in executing missed approach procedure.

3.1.6 The aircraft was continuing left turn while Flying Officer was calling for a right turn. It is possible that he was also confused and disoriented.

3.1.7 The pilots did not apply flight control surface sufficiently to counteract the left roll attitude.

3.1.8 Flaps were fully extended while the aircraft was executing missed approach.

3.1.9 The pilots applied large left control wheel while the aircraft was already rolling to the left.

3.1.10 The aircraft impacted terrain at approximately 147 knots, 36 degrees nose down and 75 degrees left roll attitude.

3.2 Probable Cause

The Aircraft Accident Investigation Committee of the Government of Thailand determines the probable cause of accident to be the pilot experienced spatial disorientation which resulted in improper control of the aircraft. Factors which contributed to accident were as follows:

3.2.1 The pilot flew the aircraft into bad weather condition which had very little or no visual reference.

3.2.2 Channelized attention occurred when all of the pilots concentration were focused on looking for the airport and neglecting to do proper cross checking or monitoring the aircraft attitude.

3.2.3 Confusion of pilots, poor teamwork or poor cockpit co-ordination in monitoring the flight instruments might contribute to loss of situational awareness and improper control of the aircraft through their false senses.

4. SAFETY RECOMMENDATIONS

4.1 In authorizing a person to be a pilot-in-command of an aircraft, responsible persons should consider his past experience. He should be promoted step by step.

4.2 Flight crew members should be properly trained in order to gain knowledge of co-operation, communications and leadership (Cockpit Resource Management)

4.3 Cockpit conversation should be cleared, corrected and in standard practices.

4.4 In conducting VFR flight, pilot must comply with Visual Flight Rules strictly and must not fly into Instrument Meteorological Condition. If he can not avoid Instrument Meteorological Condition, he must rely on his flight instruments.

4.5 Commercial airport which is regularly used for public transports should be provided with proper navigation aids and Standard Approach Procedure.

ICAO Note.— Names of personnel were deleted. The Appendices were not reproduced.